

UPPER MIOCENE RHINOCEROS PARTIAL SKELETON FROM MÂNZAȚI, VASLUI DISTRICT: PRELIMINARY DATA

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Abstract. Mânzați is a worldwide famous locality due to the largest sized dinothere *Deinotherium proavum* (= *D. gigantissimum*) unearthed to the end of 19th century. Recently, a partial rhinoceros skeleton was recovered from the uppermost Kersonian fluvial deposits exposed in the same locality, in the place named "La Nisipărie". The fossil belongs to a very large sized rhinoceros that we assign to a horned representative. Tentatively, we relate it to *Dihoplus*. The burial of the rhinoceros skeleton was rather fast, but before its ending, a part of the smaller and lighter bones as the phalanx and metacarpals were removed by fluvial streams. The cranium was partly damaged before the skeleton burial. This discovery brings new data about the rhinoceros that lived around the Kersonian/Meotian boundary in the so-called Siret-Bug land. The terrestrial sequence that yielded the rhinoceros fossils is very promising for further Upper Miocene mammal remains.

Keywords: vertebrate paleontology, rhinoceros, Late Miocene, Scythian Platform, Romania.

Rezumat. Un schelet parțial de rinocer miocen superior de la Mânzați, județul Vaslui: date preliminare. Mânzați este o localitate binecunoscută pe plan mondial în paleontologia vertebratelor, grație descoperirii unui schelet al deinoteriului de talie mare *Deinotherium proavum* (= *D. gigantissimum*), la finele secolului XIX. Recent, un schelet parțial de rinocer a fost recuperat din topul succesiunii depozitelor fluviale kersoniene care află pe teritoriul aceleiași localități, în locul numit de localnici „La Nisipărie”. Fosila revine unui rinocer de talie foarte mare, pe care îl atribuim unui reprezentant al formelor având craniul cu corn, posibil din genul *Dihoplus*. Îngroparea scheletului s-a realizat relativ rapid, dar înainte ca ea să fi fost desăvârșită, o parte dintre oasele mai mici și mai ușoare precum falangele sau metacarpalele, au fost îndepărtate de către curenții de apă. Craniul a fost parțial degradat înainte de îngropare. Această nouă descoperire aduce detalii complementare asupra rinocerilor care au viețuit în jurul limitei Chersonian/Meotian în spațiul Siret-Bug, deja emers în acele timpuri. Secvența continentală de proveniență a scheletului de rinocer este foarte promițătoare pentru descoperirea altor mamifere miocen superioare.

Cuvinte cheie: paleontologia vertebratelor, rinocer, Miocen terminal, Platforma Scitică, România.

INTRODUCTION

In eastern Romania, the Scythian Platform (abbreviated SP) means a main structural unit (SĂNDULESCU, 1984). To north, it is in contact with the East European Platform, rather its southwestern area also called Moldavian Platform (abbreviated MP; IONESI, 1994). This northern abutment is still controversial: while Săndulescu considers it as a distinct unit with a younger basement than in MP, other geologists (details and references in IONESI, 1994) referred it to a distinct subsided block, as integral part of the MP. This debate remains unsolved as long as the basement of the SP could not be crossed by any drilling while in MP the old metamorphic basement was crossed several times, being rather well known (GIUȘCĂ *et al.*, 1974). To south, the SP is in contact with the Moesian Platform and North Dobrogea chain; to west it is faulted into several blocks, dipping under the Carpathian belt; to east, it continues far outside Romania, always at north to the Alpine chains of Crimea and Great Caucasus.

Over the basement four Palaeozoic, Mesozoic and Cenozoic sedimentary megacycles may be outlined (IONESI, 1994). The last one, shared by both MP and SP, is of importance for this study. If it commonly begins with Middle Miocene (i.e. Late Badenian) deposits, it ends differently: in MP the last sequences are Late Miocene (Meotian), while in SP they continue in Pliocene and later, in Quaternary.

Beginning with the Middle Sarmatian (Bessarabian), a tendency towards terrestrial environments can be obviously recorded immediately after the intra-Volhynian Moldavian tectogenesis, when several lacustrine and coal forming swamps occurred towards the western basin margin (ȚIBULEAC & CODREA, 1997), extending soon later at the first arrival of *Hipparion* representatives from Asia, in Bessarabian (CODREA *et al.*, 1992). This tendency gradually increased later in Late Sarmatian and Meotian when the whole area emerged, forming the Siret-Bug land (POPOV *et al.*, 2004).

In these Upper Miocene environments, peculiar terrestrial vertebrate assemblages may be recorded. Among these discoveries, the most outstanding one refers to a nearly whole dinothere skeleton, unearthed by the palaeontologist Gregoriu Ștefănescu to the end of the 19th century at Mânzați (ȘTEFĂNESCU, 1895, 1899). It is the largest form of dinotheres recorded in Europe, before their definitive extinction. For the Mânzați dinothere Ștefănescu coined the name *Deinotherium gigantissimum* ȘTEFĂNESCU, 1895, soon in use worldwide mainly due to Osborn's monograph on Proboscideans (OSBORN, 1936). In fact, as one of us pointed out that long time before, EICHWALD (1835) already named this dinothere *D. proavum* EICHWALD, 1835, this first name having priority (CODREA, 1994). The age of the Mânzați dinothere was specified as Meotian. Since Ștefănescu's discovery, no other fossil vertebrate was found in this locality.

MATERIAL AND METHODS

On January 15, 2006 one of us (SMG) discovered at Mânzați (commune Ibănești, Vaslui district; Fig. 1), in the place called by natives “La Nisipărie”, at 1.50 m in depth from the surface (stereo coordinates: Y = 699984, X = 550833, Z = 165), fragments of a fossil cranium belonging to a large herbivore. Part of the fragments had been already torn out by natives; therefore they were recovered later from these people. As an example, the left last upper premolar was already in the commune major’s office, as keepsake. The place was delimited and as it was still winter time, covered by an impermeable sheet for protection. The diggings started on April 23, 2006 and lasted for forty seven days. All this time, the main problem was to protect the finding site against natives' interventions.

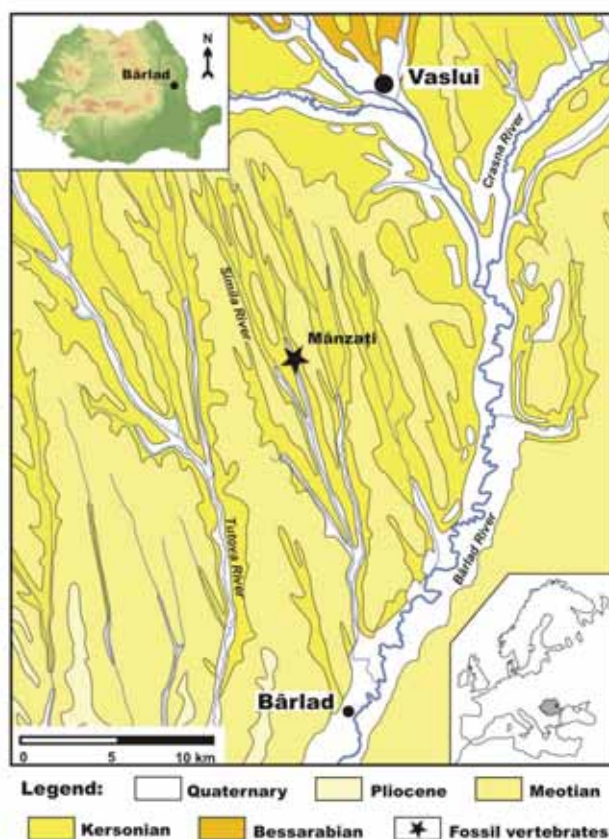


Figure 1. Location of Mânzați locality on the geological map.
 Figura 1. Localizarea localității Mânzați pe harta geologică.

After the first diggings, one realized soon that the skeleton belonged to a rhinoceros. The majority of bones was in a pretty fair state of preservation but however, some of them were crushed, damaged by sediments' overburden. In such circumstances, the skeleton area was outlined by gradual digging, and then the bones were extracted one by one in plaster jackets, following the classical protocol for the fossil large vertebrates (Fig. 2).

After unearthing, the bones were extracted from their sedimentary matrix in laboratory, impregnated by a professional polymer. The broken bones were glued using also professional reversible glue. These laboratory works are still running, after the skeleton will be studied in detail, and then exposed at the paleontological museum of the Al. I. Cuza University of Iași.

Geological setting

The rhinoceros skeleton was found at the base of the sedimentary succession exposed in the sand open pit (Fig. 3). There, over the grey clay there are fine sands (3 m thick) with hardened sandstone interbeddings of dark colour. These sands bear the fossil bones. The sands are overlain by andesitic tuffs (20-30 cm; marked I on the log) interleaving with quartz sandstone, followed by a second tuff level (II). This succession ends by fine sand, sometimes rich in limonite and bearing also mud balls. We interpret this deposit as being accumulated in a fluvial system environment. The whole sedimentary sequence exposed in this open pit concerns around six meters, between 171 and 165 m in altitude.

The rhinoceros skeleton location under the andesitic tuffs that we interpret to belong to the Ruseni Tuff Member (also called "Nuțasca-Ruseni Tuff"; in fact, Nuțasca is just the name of a forest located near Ruseni village, without any representative tuff outcrop, so we consider now to name this member in a more convenient way, just by the single name Ruseni), would indicate that this fossil is Late Sarmatian (i.e. Kersonian) in age because this tuff is

considered by rather all Romanian geologists to represent the Kersonian/Meotian boundary in the Scythian Platform (e.g. SEVASTOS, 1922; JEANRENAUD, 1961, 1971; IONESI *et al.*, 2005). In our opinion, the open pit accessed to the basal part of this member only, the remaining sequence being already eroded in this place. The fluvial deposits bearing the fossil bones belong to the Kersonian Păun Formation, also called “Balta-Păun Formation” (IONESI *et al.*, 2005; CODREA *et al.*, 2011).



Figure 2. “La Nisipărie”, the place of finding of the rhinoceros skeleton (marked high red).
 Figura 2. “La Nisipărie”, locul descoperirii scheletului de rinocer (marcat roșu închis) (original).

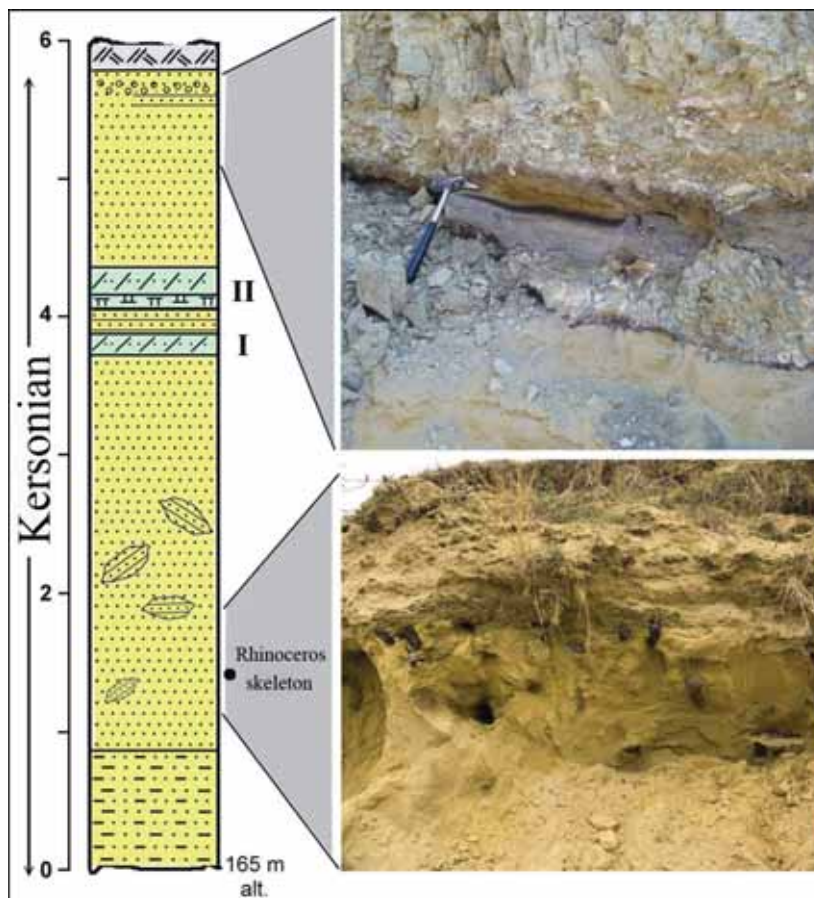


Figure 3. Lithostratigraphic log of the Kersonian deposits bearing the rhinoceros skeleton.
 Figura 3. Coloana litostratigrafică a depozitelor în care a fost descoperit scheletul de rinocer (original).

RESULTS AND DISCUSSIONS

The skeleton unearthed at Mânzati was lying on the right side of the animal, arched, and with the legs covered (Fig. 4). Its length is 2.15 m. It is trended on east-west direction. The skeleton is only partial (Fig. 5), part of bones being removed from their anatomical connections, carried away by the water streams. Probably the smaller bones were easier to be removed than the bigger ones. It is the case of the foreleg extremities, all phalanges completely missing, as well as all metacarpals. Even the still remaining bones are not in their initial position at the rhinoceros death, part of them being moved as it can be seen in figure 4. For example, several ribs were removed from their initial position. However, the concentration of the majority of bones in the same place is indicative for rather moderate strong or even faint water streams. It was probably a river channel fill, where the sedimentary input was high enough for a fast burial of the rhinoceros skeleton. This fast burial is obvious: the dark colour of the bones and the absence of cracks are arguments for this presumption.

It is worth mentioning the only partial preservation of the skull. The neurocranium is completely missing, just the nasal bone (including the horn insertions) and parts of the upper and lower jaws being recovered. One may presume that this part of the skeleton had not enough time to be covered by sediments, the missing bones being destroyed probably by weathering (?), while the thoracic cavity may have collapsed soon enough.



Figure 4. The rhinoceros skeleton *in situ*. Scale bar: 30 mm.
Figura 4. Scheletul de rinocer *in situ*. Scara grafică: 30 mm (original).

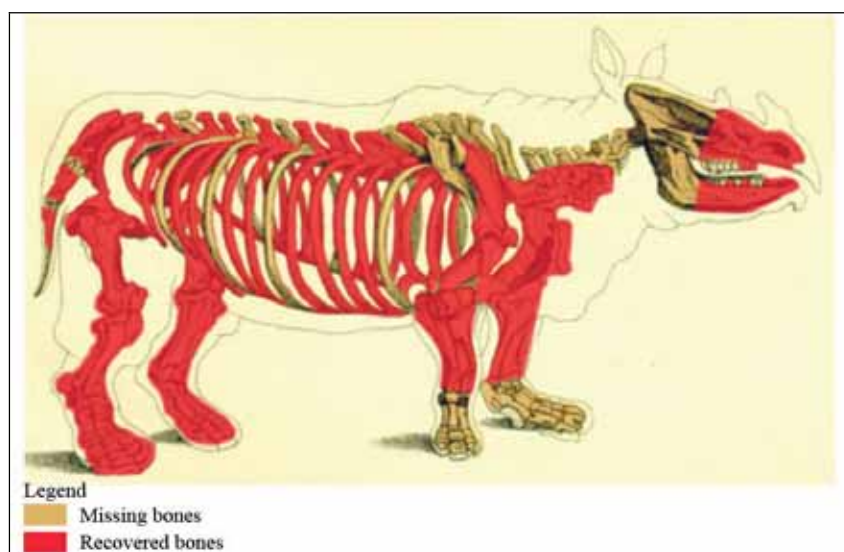


Figure 5. The rhinoceros bones, recovered and missing ones (not preserved).
Figura 5. Oasele de rinocer recuperate (culoare roșie) și cele absente (nefosilizate) (original).

The few preserved cheek teeth, as well as the post cranial bones are indicative of an adult individual, probably a male. It is a large sized rhinoceros, and the first morphological data already available for study seem to indicate a *Dihoplus* representative. Such a systematic position of the Mânzați rhinoceros is not surprising. Around the Kersonian/

Meotian boundary in Moldova, several rhinoceros were already reported: *Aceratherium incisivum* KAUP 1832 (recorded at Bacău or Reghiu; RĂDULESCU & ȘOVA, 1987; RĂDULESCU *et al.*, 1995; ȘTIUCĂ, 2003), *Chilotherium* (in both previous localities, as well as at Pogana; CODREA *et al.*, 2011) and *Dihoplus* (reported as "*Dicerorhinus orientalis*" by ALEXANDRESCU & RĂDULESCU, 1994, in fact it is probably *D. pikermiensis*, at Comănești; it is possible that the fossils reported by CIOCÂRDEL, 1943 to *A. incisivum* could also belong to *D. pikermiensis*). As the teeth morphology of the Mânzați rhinoceros completely excludes any approach to *Chilotherium*, and as the size is larger than in *A. incisivum*, we tentatively assign to *Dihoplus*.

This last genus is widely represented in the Late Miocene, in Ponto-Aegean area. GERAADS *et al.* (2009) consider that even the former reports from western Romania (CODREA, 2000) as *D. schleiermachi*, could be rather related to *D. pikermiensis*. In fact, in whole Romania such rhinoceroses are documented only by few and scarce remains, so that the discovery of the Mânzați skeleton is exceptional. It could bring by far, more details about this interesting and still disputed topic. For instance, this rhinoceros only cannot be indicative for a MN unit.

CONCLUSIONS

The discovery of a large-sized rhinoceros partial skeleton in Upper Sarmatian (Kersonian) fluvial deposits at Mânzați brings a new light on the terrestrial environments occurred at the beginning of the Late Miocene, in the so-called Siret-Bug land. We provisory assign this rhinoceros to a *Dihoplus* representative. Such a presence in the Kersonian/ Meotian boundary mammal assemblages is not surprising, as *D. pikermiensis* was already reported in the Upper Sarmatian deposits at Comănești. Further research will bring more precision on its systematic assignment, as well as on the taphonomy of the terrestrial deposits bearing Miocene mammals. For instance, we interpret this fossil as resulted from a rather fast burial in channel fill deposits; after that the water stream has removed the smaller and lighter bones. The fluvial sequence that yielded the rhinoceros bones is very promising and one may expect to unearth in the same place further mammal remains bringing more precision about the geological age of this locality.

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